

REMARKS

The Office Action dated July 21, 2003, has been received and carefully noted. The following remarks are submitted as a full and complete response thereto. Claims 1-6 are respectfully submitted for consideration.

The Applicants wish to thank Examiner Lum for the interview granted on September 17, 2003. During the interview, the rejections of claims 1-6 under 36 U.S.C §112, first and second paragraphs, and the Joshi (U.S. Patent No. 5,971,094) reference were discussed. As a result of the interview, the Examiner indicated that the §112 issues were resolved. Further the Examiner indicated that the Joshi reference was inapplicable, as it did not disclose the claimed arrangement of elements recited in claim 1.

Claims 1-6 were rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. The Office Action took the position that the configuration of elements recited in claim 1 was not evident in the Figures. The Applicants respectfully submit that the configuration recited in claim 1 and in the specification paragraph 0039 is evident in the Figures. Claim 1 recites, "the nut is disposed between the rack and the electric motor." The specification of the present application, paragraph 0039, discloses, "the nut 73 is located between the rack 32 and the electric motor 50." Fig. 1 illustrates an embodiment of the electric power steering apparatus of the present invention. Fig. 2 is an enlargement of Fig. 1, which illustrates, in part, from left to right, an electric motor 50, a ball-screw mechanism 70, and a rack 32. As recited in claim 1, the ball-screw mechanism has balls and a nut. As such, the nut of the present invention is arranged in the ball-screw mechanism and is, therefore,

between the electric motor and the rack as indicated in Fig. 1 and shown in Fig. 2. Thus, the Applicants submit that the claims recite, the figures show, and the specification discloses that the nut is between the motor and the rack.

In the interview, the Applicants pointed out the claimed arrangement. The Examiner agreed that the claimed arrangement of claim elements was definite, specifically, that the nut is between the motor and the rack. As such, the Examiner stated that the claims comply with the written description requirement, and therefore, the §112 first paragraph issues are resolved. Therefore, the Applicants respectfully request withdrawal of the rejection of claims 1-6 under 35 U.S.C. § 112, first paragraph.

Claims 1-6 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. The Office Action took the position that in claim 1, the recitation of "the nut is disposed between the rack and the electric motor" is not evident in the drawings. As discussed in detail above, claim 1 recites, and the specification, Fig. 1 and enlarged Fig. 2 disclose that the nut is disposed between the rack and the electric motor. Therefore, the Applicants respectfully submit that claims 1-6 are not indefinite, as they clearly recite the arrangement of the nut, the rack, and the electric motor of an embodiment of the present invention. As the Examiner indicated, during the interview, the claims were clarified, and the §112 second paragraph issues are resolved. Therefore, the Applicants respectfully request withdrawal of the rejections of claims 1-6 under 35 U.S.C. § 112, second paragraph.

Claims 1-4 were rejected under 35 U.S.C. §102(b) as being anticipated by Joshita. Claims 2-4 depend from claim 1. The Applicants traverse the rejection and

respectfully submit that claims 1-4 recite subject matter that is neither disclosed nor suggested by Joshita.

Claim 1 recites an electric power steering apparatus for a vehicle comprising a rack shaft extending in a transverse direction of the vehicle. The rack shaft has a rack of gear teeth formed at a portion of a peripheral surface of one end portion thereof and an externally threaded screw formed at a portion thereof excluding the one end portion on which the rack is formed. A pinion meshes with the rack and is adapted to be rotated to reciprocate the rack shaft in a longitudinal direction thereof. A ball-screw mechanism has balls and a nut threadedly engaged with the screw via the balls. An electric motor generates an assist torque corresponding to a steering torque. The motor has a hollow motor shaft extending around the rack shaft and connected to the nut such that the assist torque generated by the electric motor is transmitted from the motor shaft via the nut to the rack shaft. The nut is disposed between the rack and the electric motor.

As a result of the claimed invention, the nut of the ball-screw mechanism is assembled in the electric power steering apparatus before the motor shaft is connected to the nut. This arrangement ensures that after the electric motor undergoes a quality inspection and performance test, the rack shaft and ball-screw mechanism can be assembled with the electric motor, while keeping the motor assembled. The apparatus of the present invention can therefore be easily assembled and retain a high assembling accuracy. The Applicants submit that the prior art fails to disclose or suggest the claimed invention, and therefore, fails to provide the critical and non-obvious advantages that are provided by the invention.

Joshita discloses an electric power steering device 1 including a steering torque transmission shaft 3 which rotates by operating a steering wheel (not illustrated), a pinion 3a formed at one end of the steering torque transmission shaft 3, and a rack 4 engaged with the pinion 3a. Each of the ends of the rack 4 is joined to the vehicle's wheels. See Fig. 1 of Joshita. A motor 8 is provided so as to cover the rack 4 protruding from a pinion housing 30, which covers the pinion 3a. A screw mechanism 10 for transmitting the torque of the motor 8 to the rack 4 has a ball screw shaft 61, which is monolithically formed on the outer circumference of the rack 4. A ball nut (rotary element) 63 is screwed on the ball screw shaft 61 via a ball 62.

With respect to claim 1, the Applicants respectfully submit that Joshita fails to disclose or suggest the claimed features of the invention. Claim 1 recites that the nut is disposed between the rack and the electric motor. In contrast, Joshita discloses that the ball nut 63 of the screw mechanism 10 is disposed on a side of the motor opposite from the portion of the rack 4, which engages the pinion 3a. Fig. 1 of Joshita shows that the motor 8 is between the screw mechanism 10, having the ball nut 63, and the pinion 3a. See also Figs. 2 and 5 of Joshita. As such, the ball nut 63 in Joshita is not disposed between the portion of the rack 4 that engages the pinion 3a and the motor 8. Accordingly, Joshita fails to disclose each and every feature of the invention as recited in claim 1, and therefore claims 2-4.

According to U.S. patent practice, a reference must teach every element of a claim in order to properly anticipate the claim under 35 U.S.C. §102. In addition, “[a] claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” *Verdegaal*

*Bros. v. Union Oil Co. of California*, 814 F.2d 628,631 (Fed. Cir. 1987). "Every element of the claimed invention must be literally arranged as in the claim . . . [t]he identical invention must be shown in as complete detail as contained in the claim." *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236 (Fed. Cir. 1989). The Applicants respectfully submit that as Joshita does not disclose the identical invention, specifically, that a nut is disposed between the rack and the electric motor, the reference does not show every element arranged as in the claim. Therefore, Joshita does not anticipate claims 1-4, nor are claims 1-4 obvious in view of Joshita.

Claim 5 was rejected under 35 U.S.C. §103(a) as being unpatentable over Joshita in view of Onodera et al. (U.S. Patent No. 6,186,268 B1, "Onodera"). As discussed in the previous response, the patent number identifying Onodera is incorrect. The Applicants note that the Notice of References Cited identifies the patent number for Onodera as "US 6,186,268." Joshita was cited for disclosing many of the claimed elements of the invention, with the exception of a motor including a commutator and brushes. Onodera was cited for curing this deficiency. The Applicants traverse the rejection and respectfully submit that claim 5 recites subject matter that is neither disclosed nor suggested by the combination of Joshita and Onodera.

Onodera discloses an electric power steering unit including a rack-shaft 2, and electric motor 1 coaxially arranged around the rack-shaft 2. A ball screw mechanism for connecting a nut section 19 with a screw section 30 of the rack-shaft 2 is disposed at one end thereof. A coupling section 6 is arranged on an opposite end of the rack-shaft 2 for coupling the rack-shaft 2 with the steering column 5 of the vehicle. In the coupling section, a pinion (not shown) is arranged on the steering column 5 and the teeth of the

rack are engaged with each other so that the rotary motion of the steering column is converted into a reciprocative motion of the rack-shaft 2. A power supply section 13 comprises a commutator 22 and a brush 23 held in contact with the peripheral surface of the commutator 22.

The Applicants respectfully submit that the combination of Joshita and Onodera fails to disclose or suggest the claimed features of the invention. Claim 5 recites that the brush-contact surface extends in a plane perpendicular to an axis of the motor shaft. In contrast, Onodera, which was cited for curing the deficiencies in Joshita with respect to claim 5, discloses that the contact surface of the brush 23 with the commutator 22 is in a plane parallel to an axis of the armature shaft 11. As such, Onodera does not disclose the claimed arrangement of a brush-contact surface and a commutator as recited in claim 5. Accordingly, the combination of Joshita and Onodera fails to disclose or suggest each and every feature of the invention as recited in claim 5.

Claim 5 depends from claim 1. As discussed above, Joshita fails to disclose each and every feature of the invention as recited in claim 1 in that the reference does not disclose or suggest that a nut is disposed between the rack and the electric motor. Onodera fails to cure this deficiency in Joshita as Onodera also does not disclose that the nut 19 is disposed between the teeth of a rack arranged on an outer side portion of the rack-shaft 2 and the motor 1. Accordingly, the combination of Joshita and Onodera fails to disclose or suggest each and every feature of the invention as recited in claim 1, and therefore, dependent claim 5.

Claim 6 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Joshita in view of Sugino et al. (U.S. Patent No. 5,927,429, "Sugino"). Joshita was cited

for disclosing many of the claimed elements of the invention with the exception of a rack guide. Sugino was cited for curing this deficiency. The Applicants traverse the rejection and respectfully submit that claim 6 recites subject matter that is neither disclosed nor suggested by the combination of Joshita and Sugino.

Sugino discloses an electric power steering apparatus having a rack guide mechanism 50 provided centrally of the position of maximum engagement between the pinion 4 and the rack shaft 5, and a dish 75 provided at an intermediate portion of the rack shaft 5. The rack teeth 5a engage the pinion 4. Along the rack shaft 5, a ball screw 9 having a nut 71 is disposed on one side of an electric motor 8, and a rack-and-pinion mechanism 3 is disposed on the other side of the motor 8.

With respect to claim 6, the Applicants respectfully submit that the combination of Joshita and Sugino fails to disclose the claimed features of the invention. Claim 6 depends from claim 1. As discussed above, Joshita fails to disclose each and every feature of the invention as recited in claim 1 in that the reference does not disclose or suggest that a nut is disposed between the rack and the electric motor. Sugino fails to cure this deficiency in Joshita, as Sugino discloses that a nut 71 is disposed on a side of the motor 8 opposite from the portion of the rack shaft 5, which engages with the pinion 4. Thus, the nut 71 in Sugino is not disposed between the motor 8 and the rack teeth 5a. See Fig. 2 of Sugino. Accordingly, the combination of Joshita and Sugino fails to disclose or suggest each and every feature of the invention as recited in claim 1, and therefore, dependent claim 6.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves

or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art references, when combined, must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488 (Fed. Cir. 1991).

The Applicants respectfully submit that as the combinations of Joshita and Onodera and Joshita and Sugino do not disclose or suggest all of the claimed features of the invention as recited in claim 1, the Office Action has failed to establish a *prima facie* case of obviousness for purposes of a rejection of dependent claims 5 and 6 under 35 U.S.C. §103.

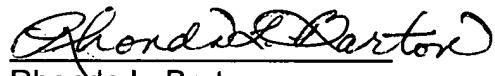
Claims 1-6 are pending. Claims 2-6 depend from claim 1. The Applicants respectfully submit that claims 2-6 are allowable for their dependency from allowable base claim 1, as well as the additional subject matter recited therein. As discussed above, the Applicants respectfully submit that claims 1-4 are not anticipated or obvious in view of Joshita. Also, claims 5 and 6 are not obvious in view of Joshita and Onodera or Joshita and Sugino, respectively. As such, the Applicants respectfully request allowance of claims 1-6 and the prompt issuance of a Notice of Allowability.

If for any reason the Examiner determines that the application is not now in condition for allowance, it is respectfully requested that the Examiner contact, by telephone, the Applicant's undersigned attorney at the telephone number listed below.

In the event this paper is not considered to be timely filed, the Applicants respectfully petition for an appropriate extension of time. Any fees for such an

extension, together with any additional fees that may be due with respect to this paper, may be charged to counsel's Deposit Account No. 01-2300, **referencing attorney docket number 101154-00009.**

Respectfully submitted,



Rhonda L. Barton  
Registration No. 47,271

**Customer No. 004372**  
ARENT FOX KINTNER PLOTKIN & KAHN PLLC  
1050 Connecticut Avenue, NW, Suite 400  
Washington, DC 20036-5339  
Telephone: (202) 857-6000  
Fax: (202) 857-6395  
RLB: ksm: wbp